CLAIMS

What is claimed is:

1. A method for deriving barycentric coordinates for a point **p** within an n-sided polygon, wherein, for a particular coordinate w_j, corresponding to a vertex $\mathbf{q_j}$, the method embodies a formula which may be expressed as follows:

$$w_j = \frac{\cot(\gamma_j) + \cot(\delta_j)}{\|\mathbf{p} - \mathbf{q_j}\|^2}$$

where δ_j and γ_j are adjacent angles to the edge $\mathbf{pq_j}$ at the vertex $\mathbf{q_j}$.

2. The method of claim 1 tangibly embodied on or in a memory.

3. The method of claim 2 wherein a series of instructions or program code embodying the method is stored in a memory.

4. A method for deriving weights w_{ij} for expressing a vertex $\mathbf{q_i}$ in a mesh representation of an object surface in terms of its one-ring neighbors $\mathbf{q_j}$, $\forall j \in N(i)$, wherein, for a particular weight w_{ij}, corresponding to a vertex $\mathbf{q_j}$, the method embodies a formula which may be expressed as follows:

$$w_{ij} = \frac{\cot(\gamma_j) + \cot(\delta_j)}{\|\mathbf{q_i} - \mathbf{q_j}\|^2}$$

where δ_j and γ_j are adjacent angles to the edge $\mathbf{q_iq_j}$ at the vertex $\mathbf{q_j}$.

5. The method of claim 4 tangibly embodied on or in a memory.

6. The method of claim 5 wherein a series of instructions or program code embodying the method is stored in a memory.

7. A method of parameterizing a mesh representation of an object surface comprising the steps of:

for one or more vertices $\mathbf{q_i}$ of the mesh representation, computing for one or more of its one-ring neighbors $\mathbf{q_j}$, $\forall j \in N(i)$, a weight w_{ij} in accordance with the following formula:

$$w_{ij} = \frac{\cot(\gamma_j) + \cot(\delta_j)}{\|\mathbf{q_i} - \mathbf{q_j}\|^2}$$

where δ_j and γ_j are adjacent angles to the edge $\mathbf{q_i q_j}$ at the vertex $\mathbf{q_j}$; and

responsive to one or more of the weights w_{ij} determined in the foregoing step, determining the parameterized coordinates of one or more of the vertices of the mesh representation.

8. The method of claim 7 further comprising fixing the positions of one or more boundary vertices in parameter space.

9. The method of claim 8 further comprising assigning each of these vertices a position on a fixed boundary **C**, where the position on the fixed boundary **C** assigned to a vertex i may be referred to as $\mathbf{C}_{u_i}$.

10. The method of claim 9 further comprising solving the following system of linear equations in order to derive the parameterization of the mesh representation:

$$\forall i,\ i \in [1....n],\ \begin{Bmatrix} \sum_{j \in N(i)} w_{ij}(\mathbf{u}_i - \mathbf{u}_j) = 0 & \text{if } i \text{ is an interior vertex} \\ \mathbf{u}_i = \mathbf{C}_{u_i} & \text{if } i \text{ is a boundary vertex} \end{Bmatrix}$$

where $\mathbf{u_i}$ is the vertex i in parameter space (and $\mathbf{u_j}$ is the vertex j in parameter space), and $\mathbf{C}_{u_i}$ is the boundary position in parameter space assigned to the boundary vertex i.

11. A method of parameterizing a mesh representation of an object surface comprising the steps of:

a step for computing, for one or more vertices $\mathbf{q_i}$ of the mesh representation and one or more of its one-ring neighbors $\mathbf{q_j}$, $\forall j \in N(i)$, a weight w_{ij} in accordance with the following formula:

$$w_{ij} = \frac{\cot(\gamma_j) + \cot(\delta_j)}{\|\mathbf{q}_i - \mathbf{q}_j\|^2}$$

where δ_j and γ_j are adjacent angles to the edge $\mathbf{q_i q_j}$ at the vertex $\mathbf{q_j}$; and

a step for determining, responsive to one or more of the weights w_{ij} determined in the foregoing step, the parameterized coordinates of one or more of the vertices of the mesh representation.

12. The methods of any of claims 1-11 tangibly embodied on or in a memory.

13. The memory of claim 12 wherein the method is embodied as a series of instructions or program code stored in the memory.

5